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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/900,565	07/06/2001	Kevin E. Spaulding	82921RLO	4100

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EXAMINER	
YANG, RYAN R	

ART UNIT	PAPER NUMBER
2672	14

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	09/900,565	SPAULDING ET AL.	
	Examiner	Art Unit	
	Ryan R Yang	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-13,15,19 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-13,15,19,20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/1/2004 has been entered.

2. This action is responsive to communications: Amendment, filed on 6/1/2004. This action is non-final.

3. Claims 2-13, 15 and 19-20 are pending in this application. Claims 19 and 20 are independent claims. In the Amendment, filed on 6/1/2004, claims 2-11, 13 and 15 were amended, claims 1, 14 and 16-18 were cancelled, and claims 19 and 20 were added.

4. The present title of the invention is "Method for representing a digital color image using a set of palette colors" as filed originally.

Claim Rejections - 35 USC § 102

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 5, 15, 19-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith (5,745,103).

7. As per claim 19, Smith discloses a method for converting an input digital color image having a set of possible input colors to an output digital color image having a set of palette colors, the number of palette colors being less than the number of possible input colors, wherein the set of palette colors is determined based on the distribution of colors in the first digital image supplemented by a distribution of important colors, comprising the steps of:

a) determining a distribution of input colors using each pixel in the input digital color image (Figure 3, item 40 is a table as a color palette representing original graphic object, where the original graphics is composed of pixels; "eight bits are used for each primary color to indicate the contribution of the primary color components, red, green, and blue, that are combined to define the color assigned to a cell in the optimal color palette", column 6, line 41-45),

b) providing a pre-determined target image of important colors (since the palette color are optimized, they are considered important color),

c) collecting additional pixels from the target image (Figure 5, item 64, 68 ... 76; "for the first and any subsequent objects remaining in the list, the logic proceeds to a block 68 in which the operating system queries the data defining the current object being processed to determine the colors used in the palette associated with that object. These colors comprise the color palette originally associated with the image or graphic object or subsequently assigned to it during any editing of the color palette", column 7, line 32-39);

d) adding the collected additional pixels to the distribution of input colors to determine a supplemented distribution of colors ("A color in the original palette associated with an object is added to the hash table if the primary color components of that color all differ from the primary color components (red, green, and blue) of any color already entered into the hash table by more than a specified tolerance", column 7, line 46-51);

e) determining a set of palette colors to be used in the formation of the output digital color image responsive to the supplemented distribution of colors (where the added color to the color palette is supplemented colors); and

f) forming the output digital color image by assigning each color in the input digital color image to one of the colors in the set of palette colors "Once all objects have been processed, the optimal color palette that results is used for displaying all of the graphic objects on the page", column 8, line 28-30).

8. As per claim 20, Smith discloses a computer storage medium having instructions stored therein for causing the computer to perform a method for converting an input digital color image having a set of possible input colors to an output digital color image having a set of palette colors, the number of palette colors being less than the number of possible input colors, wherein the set of palette colors is determined based on the distribution of colors in the first digital image supplemented by a distribution of important colors including all the elements as disclosed in claim 19, and, therefore, is similarly rejected as claim 19.

9. As per claim 5, Smith demonstrated all the elements as applied to the rejection of independent claim 1, supra, and further discloses determining the supplemented distribution of colors is accomplished by appending additional pixels to the input digital color image to form an enlarged input digital color image, where the color of the additional pixels is distributed according to the distribution of pre-defined important colors, and then determining the distribution of colors in the enlarged input digital color image ("A color in the original palette associated with an object is added to the hash table if the primary color components of that color all differ from the primary color components (red, green, and blue) of any color already entered into the hash table by more than a specified tolerance", column 7, line 46-51).

10. As per claim 15, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra, and further discloses the additional pixels are provided in the form of a predetermined target image (Figure 5, item 64, where more objects are added to the image).

Claim Rejections - 35 USC § 103

11. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

12. Claims13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith.

As per claim 13, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra.

As for the distribution of pre-defined important colors is only used to supplement the distribution of colors in the input digital color image in color regions where the input digital color image contains a significant number of pixels, since a typical image are by 256x256 or 512x512 pixels, it would have been obvious to one of ordinary skill in the art to chose image of such sizes in order to properly represent an image, and the amount of pixels in such image size is considered significant.

13. Claims 2-4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith and further in view of Balasubramanian et al. (Journal of Imaging Technology, 1991).

14. As per claim 2, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra.

Smith discloses a method of determining an optimal color palette of an image. It is noted that Smith does not explicitly disclose distribution of pre-defined important colors includes regions of skin-tone colors, however, this is known in the art as taught by Balasubramanian. Balasubramanian discloses a method of palette selection in which the regions of pre-defined important colors includes regions of skin-tone colors ("the quantization was kept fine in smooth areas such as the shoulder and cheeks", page 289, first paragraph, where it is inherent that shoulder and cheeks are regions of skin-tone, and since they are identified colors, they are pre-defined).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Balasubramanian into Smith because Smith discloses a method of determining an optimal color palette of an image and

Balasubramanian discloses a pre-defined color can be skin-tone colors in order to emphasize those colors of an image.

15. As per claim 3, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra.

Smith discloses a method of determining an optimal color palette of an image. It is noted that Smith does not explicitly disclose the distribution of pre-defined important colors includes a distribution of neutral colors, however, this is known in the art as taught by Balasubramanian. Balasubramanian discloses a method of palette selection in which "the quantization was kept fine in smooth areas", page 289, first paragraph.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Balasubramanian into Smith because Smith discloses a method of determining an optimal color palette of an image and Balasubramanian discloses regions of neutral colors can be considered as regions of important colors in order to make the region look more natural.

16. As per claim 4, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra.

Smith discloses a method of determining an optimal color palette of an image. It is noted that Smith does not explicitly disclose the distribution of pre-defined important colors includes distribution of sky colors, however, since Balasubramanian discloses "the quantization was kept fine in smooth areas", page 289, first paragraph, since the sky colors are considered smooth area.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Balasubramanian into Smith because Smith discloses a method of determining an optimal color palette of an image and Balasubramanian discloses regions of smooth area such as sky colors can be considered as regions of important colors in order to make the region look more natural.

17. As per claim 9, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra.

Smith discloses a method of determining an optimal color palette of an image. It is noted that Smith does not explicitly disclose the set of palette colors is determined using a vector quantization algorithm, however, this is known in the art as taught by Balasubramanian. Balasubramanian discloses the set of palette colors is determined using the basic algorithm which "is an application of Equitz's clustering VQ technique ...", page 284, column 2, line 30).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Balasubramanian into Smith because Smith discloses a method of determining an optimal color palette of an image and Balasubramanian discloses the set of palette colors can be determined using a vector quantization algorithm in order to efficiently select desired colors.

18. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith as applied to claim 19 above, and further in view of Balasubramanian et al. (5,432,893).

19. As per claim 6, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra.

Smith discloses a method of converting an input digital color image having a set of possible input colors to an output digital color image having a set of palette colors. It is noted that Smith does not explicitly disclose using a sequential scalar quantization algorithm to determine a set of palette colors, however, this is known in the art as taught by Balasubramanian et al. (5,432,893), hereinafter Balasubramanian (5,432,893). Balasubramanian discloses a method of determining a set of palette colors using sequential scalar quantization algorithm (column 6, line 5-18).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Balasubramanian (5,432,893) into Smith because Smith discloses a method of converting an input digital color to an output digital color having a limited set of palette colors and Balasubramanian (5,432,893) discloses the quantizing process can be performed by sequential scalar quantization algorithm in order to achieve it in an optimum and highly efficient manner, column 6, line 15.

20. As per claim 7, Smith and Balasubramanian (5,432,893) demonstrated all the elements as applied to the rejection of dependent claim 6, supra, and Balasubramanian further disclosse the sequential scalar quantization algorithm includes the steps of:

i) sequentially partitioning the colors of the supplemented distribution of colors into a set of color space regions ("sequentially partitioning said asymptotically optimal

quantizer density chrominance and luminance axes through which said histogram is defined into a plurality of histogram cells", column 31, line 43-47); and

ii) determining the set of palette colors by selecting an output color for each color space region in the set of color space regions ("for each of said histogram cells, deriving a respective set of chrominance and luminance output codes", column 31, line 48-50).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Balasubramanian (5,432,893) into Smith because Smith discloses a method of converting an input digital color to an output digital color having a limited set of palette colors and Balasubramanian (5,432,893) discloses the quantizing process can be performed by sequential scalar quantization algorithm in order to achieve it in an optimum and highly efficient manner, column 6, line 15.

21. As per claim 8, Smith and Balasubramanian demonstrated all the elements as applied to the rejection of dependent claim 7, supra, and Balasubramanian (5,432,893) further discloses determining the color value for each pixel of the output digital color image by identifying the palette color corresponding to the color space region containing the input color for the corresponding pixel of the input digital color image ("The output map spatially associates each of the pixels of the image array with one of the numerical values of the respective YCC cells of the histogram ... so that an output image displayed thereby will faithfully replicate the color content of the original digital image", column 18, line 63- column 19, line 9).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Balasubramanian (5,432,893) into Smith because Smith discloses a method of converting an input digital color to an output digital color having a limited set of palette colors and Balasubramanian (5,432,893) discloses the quantizing process can be performed by sequential scalar quantization algorithm in order to achieve it in an optimum and highly efficient manner, column 6, line 15.

22. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith and further in view of Berlin et al. (6,011,540).

As per claim 10, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra.

Smith discloses a method of determining an optimal color palette of an image. It is noted that Smith does not explicitly disclose the output digital color image is formed by assigning each color in the input digital color image to the color in the set of palette colors having the smallest color difference relative to the color of the input digital color image, however, this is known in the art as taught by Berlin et al., hereinafter Berlin. Berlin discloses a method of selecting a color palette in which the color map 218 is closest to the input values (column 8, line 66- column 9, line 1).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Berlin into Smith because Smith discloses a method of determining an optimal color palette of an image and Berlin

discloses the originally input image can be represented by selecting the closest color palette in order to better represent the original input image.

23. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith as applied to claim 19 above, and further in view of Gentile et al. (Journal of Optical Society of America, 1990)

24. As per claim 11, Smith demonstrated all the elements as applied to the rejection of independent claim 19, supra.

Smith discloses a method of converting an input digital color image having a set of possible input colors to an output digital color image having a set of palette colors. It is noted that Smith does not explicitly disclose step f) includes the use of a multi-level halftoning technique to assign each color in the input digital color image to one of the colors in the set of palette colors in such a way so as to approximately preserve the local mean color value, however, this is known in the art as taught by Gentile et al., hereinafter Gentile. Gentile discloses a method of quantizing color images using multi-level halftoning technique (see title).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Gentile into Smith because Smith discloses a method of converting input digital color image into output digital image with limited colors and Gentile discloses a method of quantizing the colors in order to achieve near-original image quality.

25. As per claim 12, Smith and Gentile demonstrated all the elements as applied to the rejection of dependent claim 11, supra, and Gentile discloses the multi-level

halftoning technique is an error diffusion technique that distributes the quantization errors introduced when processing an input pixel to nearby input pixels that have not yet been processed (page 1019, column 2, line 10-11).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Gentile into Smith because Smith discloses a method of converting input digital color image into output digital image with limited colors and Gentile discloses a method of quantizing the colors in order to achieve near-original image quality.

Response to Arguments

26. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Inquiries

28. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Ryan Yang** whose telephone number is **(703) 308-6133**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Michael Razavi**, can be reached at **(703) 305-4713**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 305-47000377.

Ryan Yang
November 9, 2004